HINGE FOR PORTABLE TERMINAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a hinge for portable terminal suitable for use in portable terminals such as a cellular phone, a PHS, and a small computer.

2. Description of the Related Art

In recent years, the function and performance of portable terminals are getting remarkably higher and the portable terminals are becoming more compact. Among them, as for a cellular phone, a PHS, and the like, in particular, the following structure is becoming on the mainstream in order to realize, when not in use, the compact size, the protection of a keyboard portion and a display portion, and further, the prevention of the malfunction of the keyboard portion. That is, a first casing having the keyboard portion and a microphone thereon and a second casing having the display portion and a speaker thereon are foldable via a hinge, with the keyboard portion and the display portion facing each other. In such a cellular phone, PHS, or the like, the display portion is formed to be vertically long so as to have a slim shape. However, now that the portable terminals are additionally equipped with various functions, for example, a downloaded movie display function and a television image display function, such a vertically long display portion is in some cases poor in visibility for those who are used to viewing a laterally long screen such as a screen of a television, a movie, a personal computer, or the like. Moreover, there has also arisen a problem such that, when information originally assumed to be displayed on a laterally long display portion is transmitted or inputted to a portable terminal having such a vertically long display portion, the information cannot be completely displayed thereon.

This has given rise to a need for a hinge that not only foldably couples the second casing to the first casing, but also allows the second casing to turn relative to the first casing in a direction perpendicular to an opening/closing direction when it is at a predetermined opening/closing position.

As a hinge having such a function, that described in Japanese Patent Application Laid-open No. 2003-69676 is known.

The hinge described in this patent application publication is structured such that a circulation spindle part of a rotary hinge part that is pivotally attached to a bottom of a first casing is bent to be led to an upper end side of a second casing and an opening/closing hinge part coupled to the second casing is attached to an upper end portion of the circulation spindle part. This structure has such a problem that a lubricating oil especially in the rotary hinge part leaks outside to stain hands and clothes, and in addition, the structure of the entire hinge becomes large to occupy a large mounting space, which hinders the downsizing of the portable terminal.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide, in a portable terminal such as a cellular phone, especially of a foldable type, a hinge for portable terminal which not only has both functions of allowing a second casing having a display portion thereon to turn in a horizontal direction relative to a first casing having a keyboard portion thereon and of allowing the second casing to open/close relative to the first casing, but also is capable of preventing a lubricating oil from leaking outside and is formed as compact as possible so that a mounting space can be saved.

In order to achieve the object stated above, the present invention is a hinge coupling a first casing on which a keyboard portion is provided and a second casing on which a display portion is provided to each other, including: a rotary hinge part to which the first casing is coupled to be turnable relative to the second casing; and an opening/closing hinge part to which the second casing is coupled to be openable/closable relative to the first casing, wherein: the rotary hinge part has a fixed member attached to the first casing and a rotary member attached to the fixed member with a turn thereof being controlled via a first cam mechanism; and the opening/closing hinge part is provided in the rotary member and has an opening/closing member which is rotatably mounted with a rotation thereof being controlled to be in a perpendicular direction to a direction of the turn of the rotary hinge part via a second cam mechanism and to which an end portion of the second casing is coupled.

In the above-described invention, the first cam mechanism may include: a first cam portion provided at an upper end of the fixed member; a hinge shaft inserted through a pivotally supporting cylinder of the fixed member in an axial direction; a second cam portion provided at a position facing the first cam portion on a lower face of the rotary member attached to an upper end portion of the hinge shaft; and a resilient means for bringing the second cam portion into pressure contact with the first cam portion provided on the fixed member side, the resilient means being resiliently provided between the hinge shaft and the pivotally supporting cylinder.

The above-described invention may also be structured such that at least one of the first cam mechanism and the second cam mechanism has an absorbing function, the absorbing function of the first cam mechanism being a function of automatically turning the rotary member from a predetermined turn angle, and the absorbing function of the second cam mechanism being a function of automatically opening/closing the opening/closing member from a predetermined opening/closing angle.

The above-described invention may also be structured such that the rotary hinge part is allowed to operate from an instant when the opening/closing hinge part is opened to a predetermined angle.

The above-described invention may also be structured such that the opening/closing member is a hinge cylinder.

The above-described invention may further include a means for allowing the rotary hinge part to operate from the instant when the opening/closing hinge part is opened to the predetermined angle, the means being provided between the opening/closing member of the opening/closing hinge part and the fixed member of the rotary hinge part.

The above-described invention may be structured such that each of the first cam mechanism and the second cam mechanism is constituted of a cam and a cam floor in which cam portions are formed on respective facing surfaces thereof, one of the cam portions being in pressure contact with the other cam portion.

The above-described structure of the present invention can bring about the following effects. It is possible to prevent a screen from being scratched as much as possible when not in use since a face of the second casing where a display portion and a camera are provided is positioned on a lower side while the second casing is folded relative to the first casing. In addition, the second casing is allowed to open/close in a vertical direction by the opening/closing hinge part and is turnable in a horizontal direction while the